**Topic: Linear Algebra** (& Manipulating Equations**) Dates: Aug 25 to Sep 5 (3 weeks)**

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| **Stage 1—Desired Results** | | | |
| **Standards:** *(Power standards in* ***bold****)*   * **GRE 502 – Determine the slope of a line from points or equation** * GRE 503 – Match linear graphs with their equations * **GRE 601 – Interpret and use information from graphs in the coordinate plane** * **GRE 604 – Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point** * **XEI 601 – Manipulate expressions and equations** * XEI 602 – Write expressions, equations, and inequalities for common algebra settings   **Common Core:**   * **GRE 502** = 8.F 4 * GRE 503 = A-CED 1 * **GRE 601** = A-CED 1, 2, 3 * **GRE 604** = G-GPE 5 * **XEI 601** = A-SSE 2, 3 * XEI 602 = A-CED 1, 2, 3   **Big rock #1: Manipulating equations** (XEI 601, XEI 602, MEA 201) | | | |
| **Enduring Understandings:**  *Students will understand that…*   * Variables can be manipulated by the same rules as numbers in an inequality, using order of operations GEMA / PEMDAS. * Coordinate planes or graphs have 4 quadrants based on the x & y axis, each with different x and y characteristics. * All points and lines can be placed on a coordinate plane or graph. * All lines have slopes based on the x & y axis. * Slopes can be found from 2 variable equations, lines on a graph, or 2 points of the line on a coordinate plane. * Parallel lines have equal slopes but different points. * Perpendicular lines have negative reciprocal slopes that intersect at one point. * Any two lines that are not parallel intersect at a point. * Most problems can be solved and explained in multiple ways (verbal, analytical, numerical, graphical). | | | **Essential Questions:**   * How do you manipulate an equation with multiple variables? * How do you read a graph? * How do you find the slope of a line in multiple ways? * How do you manipulate in different forms (standard, point slope, slope intercept) to find a line? * How do you determine what information is relevant in a word problem? * How do you find the equation of a line that is parallel or perpendicular to another line? * How do you find a point from two non-parallel lines ? * How many ways can you solve a problem? |
| **Objectives** | | | |
| *(Knowledge) Students will be able to…*   * Understand the difference between parallel & perpendicular lines. * Define, distinguish between, and apply 4 different ways of approaching an equation using VANG:   + Verbal   + Analytical   + Numerical   + Graphical * Recognize, define, and apply the following concepts (of lines / linear equations):   + slope   + x-intercept   + y-intercept   + slope-intercept form   + point-slope form   + standard form * Students will know order of operations using GEMA (GEMDAS/PEMDAS) (grouping, exponents, multiplication, division, addition, subtraction) | *(Skills/Abilities) Students will be able to…*  GRE 502 – Determine the slope of a line from points or equation   * GRE 502.a Use slope formula to determine slope, parallel vs. perpendicular, and steepness of a line (given two points or two equations)   a. work with slope on the graphing calculator  GRE 503 – Match linear graphs with their equations   * GRE 503.a Write and graph linear equations (by hand & w/ graphing calculator)  1. graph a linear equation in slope intercept 2. write a linear equation in slope intercept form given a graph 3. write the equation of a line given a point and a slope 4. write an equation of a line given two points 5. rewrite linear equations in slope intercept form 6. work with equations of lines on the graphing calculator   GRE 604 – Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point   * GRE 604.a Write the equation of a line that passes through a given point and is parallel or perpendicular to a given equation (or has a particular slope) * GRE 604.b Translate and reflect a line or shape on a coordinate plane. * GRE 604.c Find the slope of a line of best fit from points on a plane. * GRE 604.d Graph <, >, ≤, and ≥ on a coordinate plane using shading and solid / dotted lines.   GRE 601 – Interpret and use information from graphs in the coordinate plane   * GRE 601.a- Interpret and use information from graphs in the coordinate plane with perpendicular & parallel lines * GRE 601.b – Identify the intersection of two lines on a coordinate plane as a solution to two lines   XEI601 Manipulate expressions and equations   * XEI 601.a Manipulate expressions and equations using order of operations, including exponents & square roots   XEI 602 – Write expressions, equations, and inequalities for common algebra settings   * XEI 602.a Create and solve expressions representing consecutive numbers using a variable. * XEI 602.b Determine inequalities given side lengths in proportion to each other. | | |
| **Stage 2—Assessment Evidence** | | | |
| **Performance Tasks:**   * Nada! | | **Other Evidence:**   * Pre-test * Homework * Do Nows & Classwork * Exit Slips * Informal checks for understanding * **Spiraled review mastery quizzes** * Open ended response * Linear Equations test * Harkness-style * VANG solutions | |
| **Stage 3—Learning Plan** | | | |
| **Learning Activities:**   * Pre-test & review * Sketching graphs from a slope intercept equation * Writing a slope intercept equation given a point & the slope (or parallel/perpendicular to a given slope) * Write an equation for a line on a graph in slope-intercept, point-slope, and standard forms * Manipulate equations using order of operations (going between different forms for a line) | | | |
| **Stage 4 – Reflection** | | | |
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| **Test:** | 10.1 Interim |
| **Subject:** | Geometry |
| **Teacher:** | TG |
| **Q1 Interim Expected Correct:** | **28 questions** that 70% of all students will master (7 more questions than last year)  *& 14 questions that 70% of CTD class will master (double SPED from last year)* |
| **Q1 Goal % or Scale Score:** | **67%** (up from 64% last year) |
| **Discuss how you arrived at the number of questions you expect your students to answer correctly on the Q1 interim.** | #4 – Challenging. Students must know how to find slope, a line through a point, and perpendicularity.  #5 on absolute value was borderline (69%), but we’re going to get it!  #10 – challenging, multiple steps, finding the right angles, using “collinear” and supplementary angles.  #22 – Students must both find an angle (or two angles, depending on if they remember that opposite angles are equivalent) and then remember to add angles.  #23 – very challenging multiple-step conversion problem where parenthesis matter and lots of answers “look right”  #24 – many kids will misinterpret “three consecutive numberss sum is 81” as 3x = 81.  #29 – algebra gets really tricky with absolute value combined with greater/less than inequality. We didn’t know how to solve algebraically, but figured out by testing numbers.  #31 – dotted line on a coordinate plane is not a priority for us.  #33 – absolute value with inequality  #34 – three step absolute value problem.  #35 – not bad if kids remember they can approximate a line that fits the data points, but some will forget, plus it’s at the end of the test.  #36 – adding inequalities to linear algebra was not taught in the past, but I think we could at least introduce as an extension and get these numbers up (even if not at mastery)  #38 – lots of irrelevant information in the word problem. |

**Interim Score Predictions**

**Unit Plan Calendar**

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| Week 1: August 25-29 | | | | |
| **Monday** | **Tuesday** | **Wednesday** | **Thursday** | **Friday** |
| **Wk 1 – Unit 1: Linear Algebra**  **CRS** (Power in bold): **• GRE 502 – Determine the slope of a line from points or equation**  • GRE 503 – Match linear graphs with their equations  **• GRE 601 – Interpret and use information from graphs in the coordinate plane**  **• GRE 604 – Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point**  **• XEI 601 – Manipulate expressions and equations**  • XEI 602 – Write expressions, equations, and inequalities for common algebra settings (New this year)  **Big Rock #1:** Manipulating Equations (XEI 601, 602; MEA 201) | | | | |
| CRS: n/a  Objective(s): Syllabus, expectations | CRS: XEI 601  Objective(s):   * XEI 601a Manipulate expressions and equations using order of operations, including exponents & square roots | CRS: XEI 601, 602  Objective(s):   * XEI 601a, cont. * XEI 602a Create and solve expressions representing consecutive numbers using a variable. | CRS: (Algebra Review)    Objective(s):   * XEI 601a, cont. * Demonstrate mastery of 9th math material * XEI 602b Determine inequalities given side lengths in proportion to each other. | **Pre-PLAN** |
| Agenda:   * Seating * Do Now: Student survey (collect summer HW & enter LaSalles) * Intro (self & class) * Syllabus & Expectations * Linear Algebra pre-test & Big Rocks quiz #1 * If extra time, get-to-know-you game (could be later in wk) | Agenda:   * The Math Struggle * Manipulating equations * Factor & simplify expressions (especially binomials, including in fractions) | Agenda:   * Reversing conversions * Combining equations | Agenda:   * summer HW quiz * BA in Math reading * Big Rocks quiz #2 * Review x & y axis, slope as rise over run * Q: why does slope intercept form work? * Q: how can you compare slopes of lines? |

The what (content, concept, or knowledge)?

The how (process or steps)?

The why (link to bigger-picture vision and goals)? Real world connection.

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| Week 2: September 1-5 | | | | |
| **Monday** | **Tuesday** | **Wednesday** | **Thursday** | **Friday** |
| **Labor Day** | CRS: GRE 502, 503, 604  Objective(s):   * GRE 502a Use slope formula to determine slope, parallel vs. perpendicular, and steepness of a line (given two points or two equations) * GRE 503a Write and graph linear equations (by hand & w/ graphing calculator) | CRS: GRE 502, 503, 604  Objective(s):   * GRE 502a, cont. * GRE 503a, cont. | CRS: GRE 502, 503, 604    Objective(s):   * GRE 502a, cont. * GRE 503a, cont. | CRS: GRE 604  Objective(s):   * GRE 604.a Write the equation of a line that passes through a given point and is parallel or perpendicular to a given equation (or has a particular slope) * 601a - Interpret and use information from graphs in the coordinate plane with perpendicular & parallel lines |
|  | Agenda:   * “Linear Algebra Review” Day 1 (include reading tables & graphs) * Drawing lines from slope intercept form. * HW 90 (?)   (**Move to later in week?)**   * Finish writing & graphing * Start manipulating (“Linear Algebra Review” Day 2, up to 12 for HW) * Standard, Point-Slope, & Slope-Intercept forms & graphing | Agenda:   * “Linear Algebra Review” Day 2, 13-24 in class * 92 for HW * Big Rocks quiz #3 | Agenda:   * Start generating from 2 points or 1 point & slope * “Linear Algebra Review” Day 3 * Q: how can we use 3 line forms backwards, working from the coordinate plane? * Q: what is the least information you’d need to draw a line? * Challenge: variables in points on a plane (see interim 10.1 #35) | Agenda:   * Parallel lines * “Linear Algebra Review” Day 4 * Big Rocks quiz #4 |
| Week 3: Sep 8-12 | | | | |
| **Monday** | **Tuesday** | **Wednesday** | **Thursday** | **Friday** |
| CRS: GRE 601, 604  Objective(s):   * 604a, cont. * 601a, cont * GRE 601.b – Identify the intersection of two lines on a coordinate plane as a solution to two lines | CRS: GRE 601, 604  Objective(s):   * 601a, cont. * GRE 604.b Translate and reflect a line or shape on a coordinate plane. | CRS: GRE 601, 604  Objective(s):   * GRE 604.c Find the slope of a line of best fit from points on a plane. * GRE 604.d Graph <, >, ≤, and ≥ on a coordinate plane using shading and solid / dotted lines. | CRS: GRE 601, 604    Objective(s):   * 601a, cont * 604c, cont | CRS: all Unit 1 CRS  Objective(s):   * Score 80%+ on quiz |
| Agenda:   * Perpendicular lines (Day 4 continued) | Agenda:   * Translation & reflection of a line or shape | Agenda:   * Graphing < and > using shading and dotted lines, ≤ and ≥ using solid lines * Lines of best fit (from scatterplot) | Agenda:   * Review Day * Determining relevant information from a word problem | Agenda:   * Quiz |